EOS Ground System (EGS)
Test Integration & Certification
Test Oversight Committee (TICTOC)

White Paper

February 8, 1996

Abstract

The Test Integration & Certification Test Oversight Committee (TICTOC) provides a centralized forum for identifying system resources and submitting resource requests based on the Level 3 Integration and Test (I&T) schedules. By managing system resources the TICTOC identifies resource conflicts and oversubscriptions and ensures their adjudication. The TICTOC maintains the Level 3 EGS I&T schedules and can solicit changes or adjustments to those schedules due to impacts caused by changes in the development and/or deliveries of any EGS component. Finally the TICTOC is a forum for problem discussion, presenting progress and highlights, exchanging information and discussing personnel and tool support needs. This paper describes the concept of the TICTOC and how the EGS I&T groups can share information about their activities across organizational boundaries.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

1. Introduction

1.1 Purpose

The Earth Observing System (EOS) Ground System (EGS) consists of the EOS Data and Information System (EOSDIS) and interfaces to NASA institutional facilities, science teams, and interfaces between EOSDIS components. (See Figure 1.1-1). The EOSDIS includes:

- EOS Core System (ECS)
- EOS Data and Operations System (EDOS)
- EBnet (formerly ECOM)
- EOSDIS Test System (ETS)
- Science Software (provided via Flight Project management)

The EGS external interfaces to institutional data providers, include:

- Second Tracking and Data Relay Satellite System (TDRSS) Ground Terminal (STGT)
- Network Control Center (NCC)
- Flight Dynamics Division (FDD) - ingest Orbit/Attitude and Ephemeris data for production processing..
- National Meteorological Center (NMC) - ingest various types of NMC data for production processing.
- EOS spacecraft development and launch support
- Landsat-7 Ground System Elements [Landsat-7 Processing System (LPS, Image Assessment System (IAS), and Missions Operation Center (MOC)]
- ASTER Ground Data System

Other interfaces include:

- EOSDIS Users
- EOS Science Community

As the EGS components and interfaces become available, it will be necessary for the various test organizations to conduct their appropriate testing within the EGS I&T sequence as defined in the System Management Plan concept paper (See Section 1.3, Applicable Documentation). It is

possible, with the size of the EGS and the number of test organizations, that there may be conflicts over time and resource availability, between the various organizations. An EGS Test Integration & Certification Test Oversight Committee (TICTOC) is being formed to help the various integration and test (I&T) groups resolve conflicts (or potential conflicts) and share lessons learned.
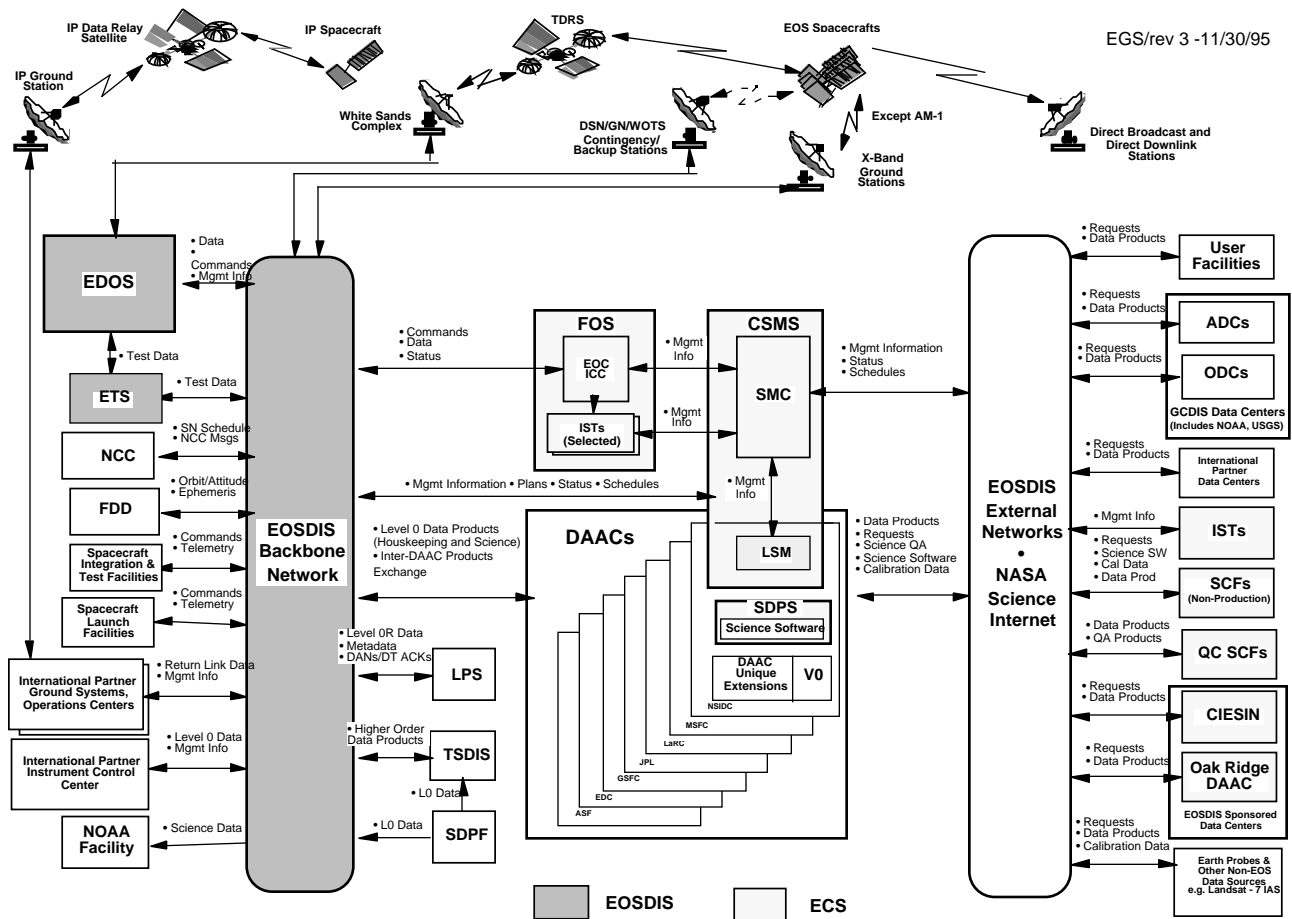
Figure 1.1-1 - EOS Ground System

Figure 1.1-2 shows the build up of the EGS from component acceptance through system acceptance and its relationship to EOS on-orbit missions. Early deliveries of the EOSDIS components are integrated into a system release which allows EGS level integration to be accomplished in parallel with the building of the next EOSDIS release. Each Version of EOSDIS is specifically identified as a mission release but it also provides test capabilities for upcoming missions. Version 1 is the TRMM mission release and the EOS AM-1/Landsat 7 test release. Version 2 is the Landsat 7 and EOS AM-1 mission release.

EGS I&T Implementation

EOSDIS Version 2
EOS AM-1/Landsat-7 Mission

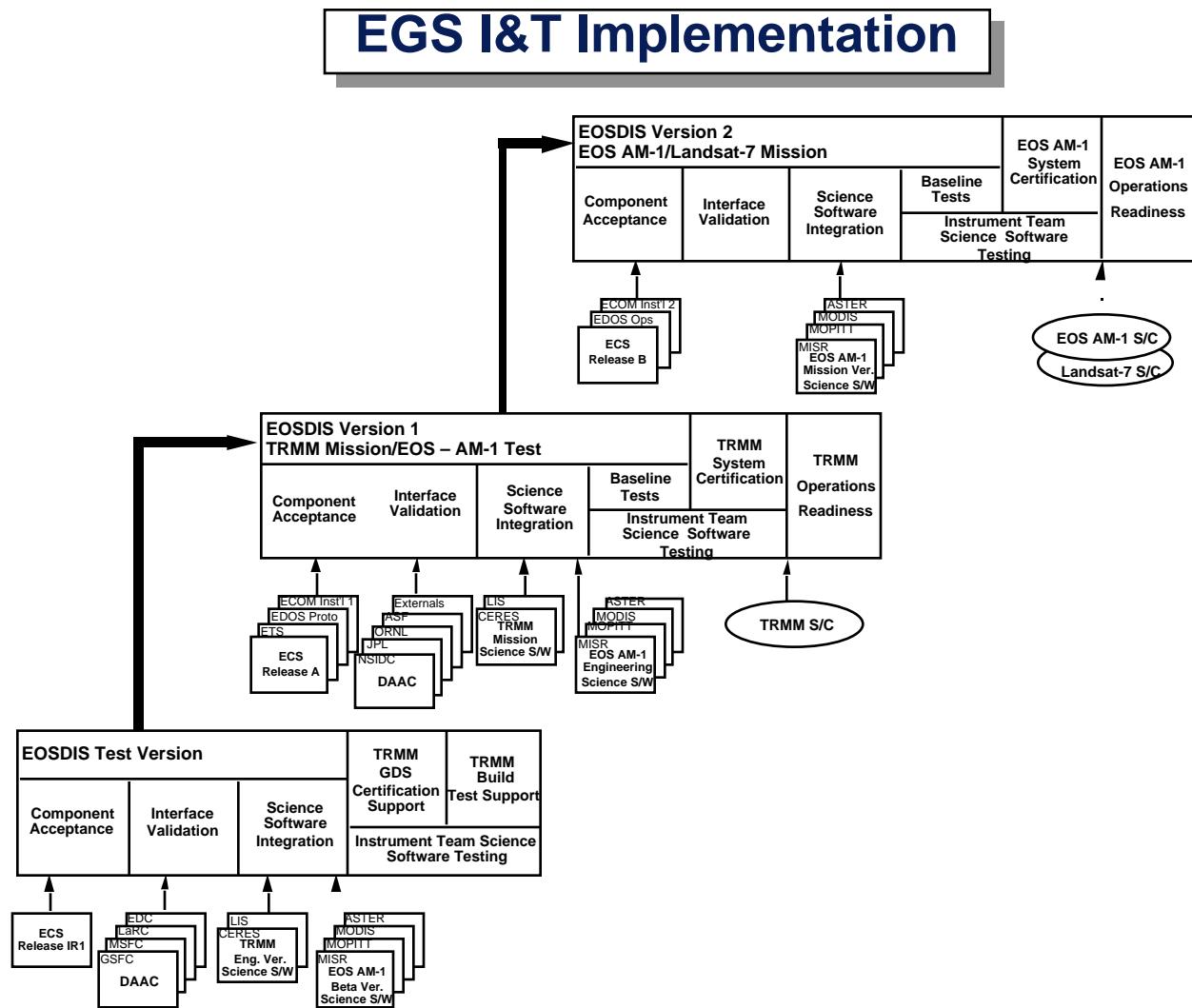| Component Acceptance	Interface Validation	Science Software Integration	Baseline Tests	EOS AM-1 System Certification	EOS AM-1 Operations Readiness
			Instrument Team Science Software Testing		

ECOM Instl 2
EDOS Ops
ECS Release B

ASTER
MODIS
MOPITT
MISR
EOS AM-1 Mission Ver. Science S/W

EOS AM-1 S/C
Landsat-7 S/C

EOSDIS Version 1
TRMM Mission/EOS – AM-1 Test

Component Acceptance	Interface Validation	Science Software Integration	Baseline Tests	TRMM System Certification	TRMM Operations Readiness
			Instrument Team Science Software Testing		

ECOM Instl 1
EDOS Proto
ETS
ECS Release A

Externals
ASF
ORNL
JPL
NSIDC
DAAC

LIS
CERES
TRMM Mission Science S/W

ASTER
MODIS
MOPITT
MISR
EOS AM-1 Engineering Science S/W

TRMM S/C

EOSDIS Test Version

Component Acceptance	Interface Validation	Science Software Integration	TRMM GDS Certification Support	TRMM Build Test Support
			Instrument Team Science Software Testing	

ECS Release IR1

EDC
LaRC
MSFC
GSFC
DAAC

LIS
CERES
TRMM Eng. Ver. Science S/W

ASTER
MODIS
MOPITT
MISR
EOS AM-1 Beta Ver. Science S/W

Figure 1.1-2 - EGS I&T Implementation

This paper describes the concept for the EGS TICTOC which will provide an opportunity for all groups performing EGS I&T activities to meet regularly and share information and concerns across organizational boundaries. Figure 1.1-3 shows the organization and named individuals within that organization, and the contractors, who have been delegated to implement the specific test related activities. The ESDIS SI&T manager coordinates overall EGS I&T activities to ensure effective and efficient utilization of available resources. In addition to including contractors for all test levels, other representation will include Operations (DAAC, Operations Readiness Support, etc.), AM-1, Landsat-7, Tropical Rainfall Measuring Mission (TRMM) and Test Tool developers.
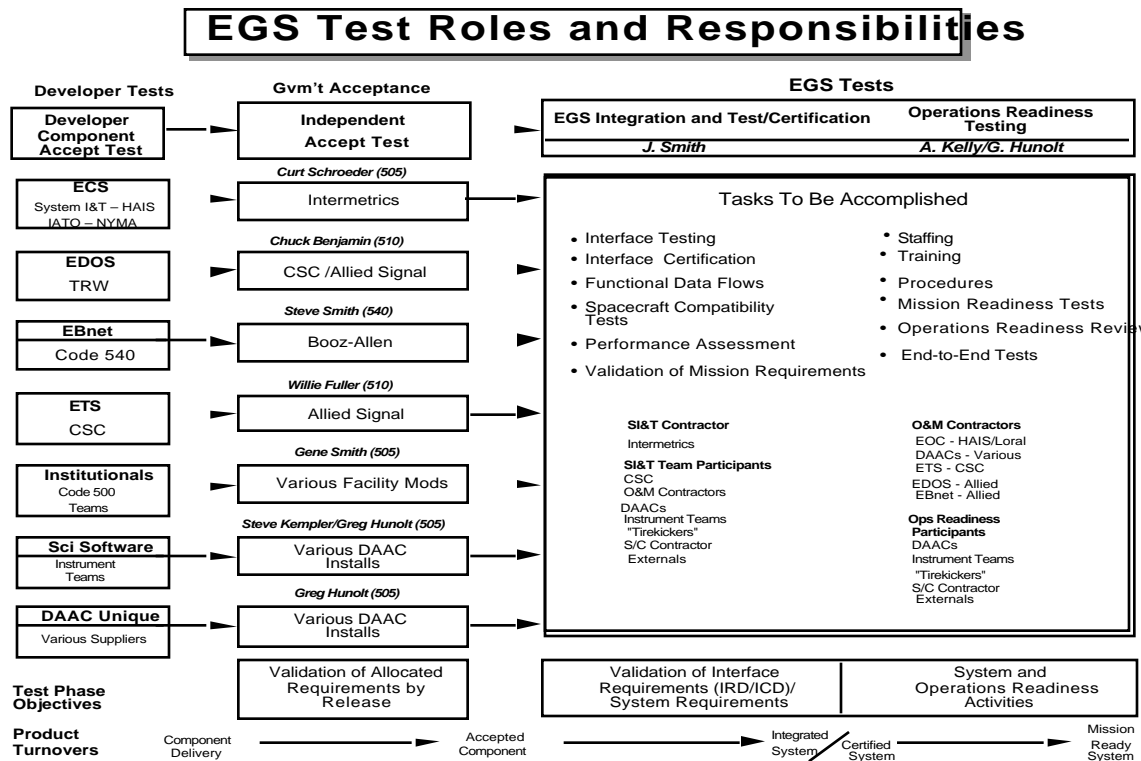
EGS Test Roles and Responsibilities

Figure 1.1-3 EGS Test Roles and Responsibilities

1.2 Scope

The paper focuses on the concepts, charter, directives, participants and format for the TICTOC as they pertain to the various EGS testing and integration organizations. The paper describes how the TICTOC operates to assist test groups in coordinating problems and/or concerns encountered in performing their integration and test activities and share lessons learned from their experiences.

1.3 Applicable Documentation

The following documents provided guidance and information used to produce this white paper. The URL for the documents listed below is also provided:

URL: http://esdis/integ/integ.html

ESDIS-SI&T-PHIL   ESDIS System Integration and Test Philosophy
                          Paper, Baseline, March 1995

EOSVV-1005-   EOS Ground System (EGS) Integration, Test and Validation
05/15/95   Plan (EITVP), May 1995

                 System Management Plan (SMP)

1.4 Document Organization

The TICTOC White Paper is organized as described below.

Section 1   Contains the purpose and scope of the document and a list of
documentation used as references for this white paper.

Section 2   Describes the TICTOC charter, function, the participants, and
other pertinent TICTOC activities.

Section 3   Defines the format of and the products expected from the
TICTOC.

2. TICTOC Charter

2.1. Definition

The TICTOC is a forum by which the various I&T groups can discuss:

- Planning issues that may effect I&T efforts across organizational boundaries
- Deficiencies
- Problems encountered while performing I&T activities
- Resource needs/planning (i.e. availability of test data) and contention (i.e. availability of hardware and system resources)

The TICTOC replaces the EGS I&T Working Group Meeting which will become a quarterly status review. Minutes generated for each TICTOC will be distributed and made available on the ESDIS System Integration and Test Homepage (URL = http://esdis.gsfc.nasa.gov/integ/).

2.2. Function

The TICTOC is a bi-weekly meeting in which representatives of the various testing organizations, test tool developers and operations personnel meet to discuss current and upcoming activities related to EGS I&T in support of end-to-end testing. The functions of the TICTOC are:

1) Monitoring/EGS I&T Schedule
   - Track progress of test related activities across all phases of EGS I&T
   - Identify schedule issues, dependencies, and proposed changes
   - Identify and adjust test prioritization among the test organizations and EGS elements
2) Testing organizations identify external testing needs of all EGS elements
   - Resolve contention among the various EGS elements
   - Identify Test Tool/Resource Contention
   - Provide for prioritization of resources
3) Review critical test discrepancies ("show stoppers") and provide insight into resolutions
   - Identify and evaluate risks
4) Maintain adherence to the defined ESDIS I&T process

5)   Testing organizations provide guidelines for scheduling of formal tests and equipment/resources

6)   Facilitate the review of test related documentation
   •   Sections of documents for pre-review and approval to expedite the review cycle of complete documents
   •   Review comments generated from pre-reviews (splinter groups)
   •   Promote the sharing of test data
   •   Compliance with Test Data Management Guidelines

7)   Share and disseminate:
    •   Lessons learned
    •   Information from workshops such as the Data Systems Working
            Group (DSWG)
    •   Issues and trouble areas that may require splinter groups
    •   Flight related testing
8)   Identify and maintain Action Items (AI)

2.3. Participants

The ESDIS SI&T Manager, Janice Smith, will chair the TICTOC. Recording
and distribution of the TICTOC minutes is the responsibility of the ESDIS
SI&T Support Team.

The TICTOC meetings will consist of a representative(s) (government
and/or contractor) from each testing organization, test tool development
and operations, as shown in Figure 1.1-3. The participants will be familiar
with the status and issues associated with their testing. Each participant
will be prepared to discuss all test-related concerns and issues that may
have an impact on their progress. Table 2.2-1 is a list of each of the
required test areas/organizations and contacts.

Table 2.2-1 - TICTOC Participants

Janice Smith, Chairperson	
Phase	Test Activities
Development	ECS,EDOS, Ebnet, ETS, Institutionals, Flight Specifics
Component Testing	ECS (IV&V), EDOS (SEAS/NMOS), Ebnet (NMOS)
System I&T	Interface (SI&T), Spacecraft I/F, Science Software I&T
Mission Operations	SIMS, OREs, ORTs, Flight Project Reps
Operations Testing	DAACs, EOC, EDOS

2.4. Other TICTOC Activities

Splinter Groups may be required to discuss areas of concern that cannot be resolved within the time allotted for the TICTOC. Splinter groups are designated with specific individuals to (for example):
• Evaluate difficulties of the test process and cooperatively recommend improvements
• Research alternatives when resources or deliveries are not available or not complete

It is recommended that TICTOC members pre-review test documentation. Members may be given pre-release copies of document sections for early review.

Individual presentations or demonstrations may be included as part of the TICTOC with advance notice and preparation. An example of this would be a presentation of the Test Data Management (TDM) Tool.

3. Meeting Organization

3.1. Format

TICTOC meetings will follow the same basic format, but specific content will focus on the current and near term testing activities. This meeting is a working group with an open forum. Each representative will be expected to give a detailed briefing of their test activities in a round table format. However, if discussions become too long or detailed, either splinter groups will be designated or an AI will be written. If a splinter group is required, a report from one member of the splinter group will be expected at the next meeting. The format of the TICTOC is as follows:

<u>**TICTOC FORMAT**</u>
(1 1/2 to 2 hours)

1. <u>Introduction</u> (ESDIS SI&T Manager) (10-15 minutes)
   - Agenda, Schedules, and important issues, newsworthy notes
   - Previous Meeting Actions/Reports (Meeting Coordinator for AIs and designated Splinter Group Members)
   - Review of open AIs
   - Reports from splinter meetings

2. <u>Development Status/Progress</u> (5-10 minutes/each)
   - ECS
   - EDOS
   - EBnet
   - ETS

3. <u>Component Testing</u> (5-10 minutes/each)
   - ECS (IV&V)
   - EDOS (SEAS/NMOS)
   - EBnet (NMOS)

4. <u>SI&T</u> (10-15 minutes total)
   - Interface (SI&T)
   - Spacecraft Interface (Flight/Ground)

- Certification (*future*)

5. <u>Science Software Integration</u> (10 minutes total)

6. <u>Mission Operations</u> (10 minutes total)
   - Simulations, Operational Readiness Exercises (OREs), Operational Readiness Tests (ORTs)

7. <u>Operations Testing</u> (DAACs) (10-15 minutes total)

8. <u>Future Tests and Activities</u> (e.g. workshops, ESRs, WGMs, etc.) (20 - 30 minutes)

9. <u>Summary</u> (10 minutes)
   - Review of identified AIs

3.2. Products of TICTOC

3.2.1 Action Items

Action Items resulting from TICTOC meetings will be identified and tracked at each TICTOC meeting. AIs will be maintained and distributed at the TICTOC. A list of AIs and their status will be available on-line through the Internet.

3.2.2 Lessons Learned

An important result of TICTOC meetings will be a compilation of lessons learned from all of the EGS I&T organizations. Lessons learned will be available through the ESDIS SI&T Homepage.

3.2.3 RAT Product (TBS)